

# HAIGHT (N.)

A practical treatise on the  
Water delivered by the  
Manhattan Company xx





A PRACTICAL TREATISE

ON THE

WATER

DELIVERED BY THE

MANHATTAN COMPANY,

WITH

PRACTICAL OBSERVATIONS ON WATERS

SURROUNDING THE

CITY OF NEW-YORK.

By NICHOLAS HAIGHT, Dyer.

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## INTRODUCTION.



BEING brought up to the Dry-Goods business, and for several years pursued that, in connection with carpeting, for my own benefit ; matter, and things of this great universe, and the philosophy of properties and causes, why and wherefore all nature progressed, seldom or never entered my mind. In the year 1820, my brother and myself began, in this city, the foundation of the present extensive Ingrained Carpet Manufactory, now owned by the Jersey Little-Falls Manufacturing Company—he as a mechanic and machinest, while I was sedulously devoting my time to sales, and means to extend the same. Among the vast variety of difficulties which presented to the accomplishment of our object, was the art of dying. That art being absolutely necessary to be practised, equal with others in the world, before the great desideratum could be obtained—*public satisfaction*—inquiry was made in every part of this country for a man who was master of the art. Application was also made on the other side of the Atlantic, without success. All that offered as workmen in the art, put to trial ; and none found that would answer the object sought for. One whole year was spent in these fruitless and perplexing trials, during which time I resorted to various authors on the art, which at first I found only served to perplex me, and involve me in further darkness. I resorted lastly to the philosophic causes, and endeavored to answer the following questions :—What is colour, or the cause of colour ? By what means is it to be applied, and to what is it applicable ?

The following answers was the result :—The cause of colour is light. To apply it must be by the agency of water, atmospheric air, and heat. Colour, by these agents, is applicable to all substances where there is an affinity. It will readily be perceived, that water necessarily has engaged much of my time, and that I must understand its properties, to cause it to be subject to my wishes.

It is not my intention to enter into detail of my profession, any further than what relates to water, and its properties ; the sources from whence derived. My practice upon this element in applying it to my art, has been such as to astonish the theorist, and upset their visionary ideas of that element, as taken from the bowels of the earth—from the clouds of heaven, the rippling stream, and the roaring river. I have had no other interest in view in solving the mysteries of nature in this element, but to accomplish the perfection of my art. Each step I progressed—each and every fact I proved, although new to former practitioners in the art, and at variance with all theoretical chemists, I had no desire to dispute with them, nor solicit their consent to my views. My objects were obtained, and myself satisfied with the result of all my investigations. I am also well satisfied, that theorists on any subject, who never reduce their theory to practice, either because they cannot or will not, are men fatally dangerous to all practitioners. The opinions of such ought not to have any more weight than what their practice will prove.

The result of my operations with the Manhattan water, of this city, has been so much to the reverse of these gentlemen's opinions, (and I presume their wishes) that it has been undertaken to establish their error, by stating that from this water I had extracted *White Paint, White Lead, Poison, &c.* I now unhesitatingly declare, that the sediment which I precipitate does not contain any of these properties. Through the means of Mr. Garniss and Mr. Post, surreptitiously and under false suggestions, Mr. Garniss did obtain from me a brief statement of the manner in which it was precipitated, and the necessity of doing so, to render it sub-

ject to my wishes. That paper does not contain any opinion of mine as to the properties that the sediment contains; and I never ventured an opinion on that point until now, whatever may be said by these men, or any others, to the contrary notwithstanding.

## PRACTICAL OPERATIONS AND RESULTS.

Water, until modern times, was considered as an elementary, or simple substance. I find no chemical experiment performed on it, to ascertain what substances it might contain, until the year 1776, which was in England: and the first in France in the year 1783—since which time, the analysis of water has employed the attention of the first chemists.

In applying the Manhattan water to the purposes of dying, I have found it to possess soda, marine salt, a minute proportion of magnesia, and a one hundred and sixty thousandth part of its weight, of a white earthy substance, in which is contained the magnesia; and no other substances whatever.

I also discovered, that it was not always the same. At certain times the soda that it contained would predominate in certain cases, which would prove injurious in some colours, and beneficial in others. At other times, the properties of the water would apparently harmonize, and prove much more beneficial to all the colours. To ascertain the cause of this, I made the following observations:—On Mondays, and at other times, when the reservoir of the Company was full, and had stood some time, the water was much softer and more pliant to my wishes. To prove this, I placed vessels full in the open air, and found its exposure even for a short time, produced an agreeable effect upon all its properties. By following up these results, and ascertaining the causes of it, (being through the operations of the atmosphere) I resolved to put it into general operation, with the atmospheric air, as far as it was practicable. I accordingly gave it all the exposure in my power, with the situa-

tion of the building ; and from which I took the principal part of the earthy substance which it necessarily must obtain in passing through the logs.

In placing the water in the kettles, and bringing it to a boiling heat, a farther operation was produced upon its properties. The earthy substance, with the magnesia, (through the agency of the soda and marine salt no doubt) was attracted by the heat, and would place itself on the kettle in its hottest parts. This result opened an idea to my mind, as new as it was beneficial in itself. If I could pursue my work without its obstruction, and be rid of it altogether, I conceived it would be very desirable. To obtain this, the *steam* was applied, as the only method to give us the water, free from the earthy substance ; and possessing in itself all its other beneficial properties. I now, and have for these three years past, pursued my business with much satisfaction ; using altogether the Manhattan water, notwithstanding it is at variance with every author that has ever written on the art, except one, Mr. Wm. Partridge, of this city, a gentleman who I consider has a considerable share of practical information in the art. I therefore introduce a part of his essay on water, as it accords with my practice, and is the first that has published such principles to the world.

*“ On the effects which Water has on Dying.*

“ Whenever this subject has been mentioned by theoretical writers, it has been but briefly noticed, as a subject of minor consequence, and their opinions have been uniformly erroneous.

“ I had no conception when I left England, that water could have had so material an effect in the production of colour, as I have since found it to possess. I have practiced the art in this country in four states, and have found that given proportions of the same description of ingredients would not produce the same colour in any two ; there would in each, be a considerable variation in the hue and body of the colour. I shall endeavour to draw such inferences from

the facts that have been developed during my practice in both countries, as will carry conviction to every unprejudiced mind ; and I humbly hope my opinion will be entitled to that consideration which the importance of the subject demands.

“ In a conversation I lately had with one of the Messrs. Haight, carpet manufacturers of this city, I was much pleased to find that his opinion on the effects of water, corresponded with mine in every particular. It was gratifying to have this opinion sanctioned by a gentleman possessing so much practical and theoretical knowledge, as it is at variance with all who have ever before written on the subject.

“ An idea has been handed down from the earliest writers, and reiterated by every one to the present day, that none but soft water is fit to be used in dying. They say that “if the water meant to be employed, be hard, and not fit for washing, or curdles soap, it is not fit for dying light colours.” Although this idea has been taken for granted by every author, and been as generally received by the most intelligent practical dyers, yet it is altogether erroneous ; and I will venture to assert, that spring water free from metallic oxids, and marine salts, is, however hard, better calculated for dying, than any larger stream having a distant source, however soft.

“ When I left England, I was impressed with the prevailing notion that none but soft water could be used for dying. It was the opinion of my father, and his predecessors in the same business, who have been eminent dyers for more than a century ; and this in direct opposition to their own daily practice ; for they had all this time been making use of spring water, that was very hard, would curdle soap, and was unfit for washing, in preference to water from a fine mill stream, that ran between the dye-houses, and was remarkably soft. And I am convinced they have owed their celebrity, purely to this circumstance. My practice in America has convinced me of this important fact, that any water, with the exceptions before mentioned, may be used access-fully by the dyer, with one proviso—that it is always in the

same state. Water that is variable in its property, can never be used with any prospect of success : it is on this account that springs are better calculated for the purpose than mill-streams.

“ That river water is ever varying, is too obvious to be doubted. After much rain, by far the greater part will be rain water : in a dry season it will be altogether the produce of springs, and the shades of difference will vary almost daily. Can it be expected that a medium ever variable should be calculated to produce certain and invariable results ? The dyer who uses river water (excepting in certain cases which will hereafter be mentioned) must, therefore, be subject to continual disappointment, and probably without the least suspicion of the cause. He will go blundering along for years in the dark, sometimes much to his satisfaction, at other times deceived in the expected results ; he will blame the dye-wares ; will expect they have been adulterated by the dealer, or will charge his workmen with carelessness and neglect ; any and every thing will be suspected rather than the true cause.

“ Let every American dyer, that is stationary, contrive some mode of obtaining water that shall always be in the same state, and I will venture to predict they will soon become as eminent as those of any other country. This has already been done by Messrs. Hights of New-York, and the result, whilst it affords an example to all others, reflects infinite credit on themselves. I have never seen a dying establishment better systematised, or more happily contrived to answer every purpose than theirs. Their plan for collecting water, and the modes contrived to have it always in the same state, are so masterly, and so consonant with the opinion I have been advocating, that I cannot elucidate the subject better than by giving a description of this part of the establishment, and the reason why they were compelled to adopt it.

“ These gentlemen are carpet manufacturers, and their dying is done altogether in the yarn. When they first began their business they were much plagued by the uncer-

tainty attendant on their colouring. To obviate this difficulty was necessary to their success, and they considered the variableness of the water as the principal cause. The Manhattan water which they use, is pumped from springs, yet it was found to be variable, chiefly owing to its containing at times an unusual portion of marine salts. To ensure a regular supply, uniformly the same, they adopted the following mode : the water is first received in a large, open, oblong reservoir, where it is exposed to the atmosphere, and permitted to deposit its impurities : it is drawn off from this to a second reservoir, lying under the other, which is closely covered. The pipe that conveys the water from the first reservoir, is placed nine inches above the bottom, leaving room below it for the sediment to collect. Of course none of the settled impurities can be drawn from the first to the second. It is pumped from the second to a third, which is placed over the dye-house, and sixteen feet above the lower one. The pump is so fixed as not to draw off, or disturb the water lying within nine inches of the bottom, and it is drawn for use from the upper receiver, with the same precaution not to disturb the sediment. The reservoirs are cleaned periodically ; by these means they have been able to produce every colour with the utmost certainty."

During my researches for better and purer water than what I was using, I began with rain-water, as that has always been admitted to be the purest. The result was as follows : It contained more earthy substance than the Manhattan ; apparently composed of animal and vegetable matter. This was not tractable by heat ; hence it was in continued solution : I also found soda, and marine properties to a small degree, or lime. This I presume must have been brought with it as it fell to the earth, through the quantity of earthy matter the atmosphere holds over such a populous city as New-York.

I have tried the spring water at Fort Gansevoort, on this Island. It is soft, owing to its possessing less soda than

the Manhattan water; still not differing in its properties nor effects. I have examined the waters of the Passaic, in New-Jersey; it possesses the greatest quantity of earthy, vegetable and animal matter of any water I know. The Bronx river, and the Saw-Mill river, both in Westchester county, possess lime, marine salt, and also earthy matter composed of vegetable and animal substances. These waters I should prefer to any other, for their fermenting qualities; and should suppose them better calculated for the brewer and distiller, than any other purposes. Such water is absolutely necessary in one particular branch of my art—the *Woad Dying*—where fermentation is required to perfect the dye: and I would further quote Mr. Wm. Partridge on that subject.

“In dying blue colours,” says he, “soft water should be used in the vats. This exception is not on account of the colour, it is merely a saving of vegetable ferments. Hard water is not so favourable in promoting fermentation, as soft is, and when used in the blue vat, a greater than the usual quantity of bran and madder must be employed, or the fermentation will not be sufficiently vigorous. Hard water is best for washing wool after it has been coloured: it is preferable also for washing cloth after braying, and fulling; and where a convenient supply of spring water can be obtained at an easy expense, it should be led into convenient receptacles, from whence it can be drawn when wanted.”

In all my researches in the properties of water, I have come to the same conclusion as Dr. URE, a celebrated chemist of Scotland, from whose works I quote the following, being so completely consonant with my experience and observations:

“Native water is seldom or ever found perfectly pure. The waters that flow within, or upon the surface of the earth, contain various earthy, saline, metallic, vegetable or animal particles, according to the substances over or through

which they pass. Rain or snow waters are much purer than these, although they contain whatever floats in the air, or has been exhaled along with the watery vapours."

Doctor Ure's views are clear and distinct : as they all bear the test of practice so far as I have proceeded ; and I further quote him :—

" The topography of the place where the waters rise, is the first thing to be considered : by examining the ooze formed by them, and the earth or stones through which they are strained or filtered, some judgment may be formed of their contents. In filtering through the earth, and meandering on its surface, they take with them particles of various kinds, which their extreme extenuation renders capable of being suspended in the fluid that serves for their vehicle."

It is well known that this Island contains no mineral properties whatever ; being principally composed of sand and granite. The waters that fall upon the surface of the Island, and also the snow, is at all times more or less charged with marine salt and earthy substances, which they necessarily exhale with the vapours from the sea, and from the rivers ; and when they have discharged themselves upon the earth, the earthy substance and its marine properties serve to nourish and enrich, while the water passes downward to the bowels of the earth ; forming itself into small streams, and discharging its surplus through springs and other openings, into the adjacent rivers. By penetrating then to the depth of the bottom of the East and Hudson rivers, which are immediately on each side, the courses of these streams from the earth's surface, and those from these two rivers, are impeded, and through the aperture the water is brought to the earth's surface, pure as any native water can be in similar situations. It possesses soda and marine properties, which, no doubt, are derived from the filtering of the rivers : so had the rain water the same properties when it fell to the earth, although rendered pure by the earth's filtration ; but again received the same properties to a greater

degree, by these two rivers, taking with it the earthy properties through which it has passed; being a white earthy substance containing magnesia—without any other substance whatever.

Within these last two months, I have instituted and put into operation, a complete test to all my former practice in dying; which also is a practical test as to the water I use. It is admitted that water procured by distillation is as perfectly pure as the art of man can obtain; as it can only possess a small proportion of the properties of the vessel in which it is distilled and condensed. By thus distilling the Manhattan water, which I use, and applying it to my art, I find the difference is no more, in the appearance of colour, nor in the ease of its execution, than that there is less earthy matter to be found. Hence it brings me to this conclusion—that the Manhattan water in this city is as pure as any native water; and that the properties it possesses are not injurious to health, or to the purposes of art, provided the artist understands his business.

That this Island does contain within her own bowels a sufficiency of pure and wholesome water, for all the purposes of the city, even if it were extended over the whole Island, and for as many manufactories as would necessarily be located in this city; there is no doubt in my mind. The Island being surrounded by salt water; Westchester county, and the Highlands on its north-east, being so much higher than this Island, send to these rivers and the ocean vast streams of water through the bowels of the earth. And by boring in various places no doubt the result will prove as beneficial as in other parts. The art of boring into the bowels of the earth is an idea very recently put into practice. The first attempt I have any knowledge of, was at Dunfirmline in Scotland. This town stands on the declivity of a ridge: to obtain a supply of water was of great moment. They continued boring, the depth I am not prepared to say, but to a very great distance, when they were amply rewarded by an abundance of water rising some distance above the earth

the size of the bore. This subject has also been agitated in this country, but I have never heard of its being put into operation, except at New-Brunswick, N. J. The result of one individual's labour there is highly flattering. On the highest ground in the neighbourhood of that place, a bore of three inches in diameter has been made to the depth of 235 feet, through which the water flows to the earth's surface. Another bore of the same size has been made to the depth of 170 feet, through which the water flows to the earth's surface, discharging four gallons in a minute; and by inserting a tube, it will rise to the height of fifteen feet above the surface of the earth, discharging one and a half gallons per minute.

Water brought into this city from the Bronx, Saw-mill River, or the Passaic of New-Jersey, although soft, they would be found to contain marine salt, lime, and a great proportion of earth, vegetable and animal properties; and if the same is thrown into large basins, for the purpose of discharging these properties, the water would acquire while so remaining, a greater share of marine properties by its contiguity to the salt water; and although much of the filth would be reserved, still it would not be as pure as that raised from the bowels of the earth; and as to its application in my art, it would necessarily have to be filtered in the same manner as the Manhattan water is now; and its containing lime and marine salt, would render it perfectly useless, and I could not proceed with it at all. To the brewer and distiller it would be advantageous, as it would be more vigorous in its fermentation, and to all purposes where fermentation is required.

It would cause all deposits in reservoirs to become a mass of putrid matter, and no doubt the harbinger of various diseases in a populous city.

Could such streams of water be let at pleasure on our streets to wash away the dirt and filth of each day, and could be sure of every morning's sun to evaporate its dampness, and dry up all those earthy, vegetable, and animal sub-

stances which it would leave behind that they would cease to act, it would be an apparent blessing.

But as the great Ruler of the universe has ordained that he will grant us that supply from his clouds when he thinks it necessary, I am decidedly of opinion that he will continue his blessings as he has heretofore done, of which we have no cause to complain.



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